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[SIXTH SERIES.]

"..... per litora spargite muscum,
Naiades, et circum vitreos considite fontes;
Pollice virgineo teneros hic carpite flores;
Floribus et pictum, divæ, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas;
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Deæ pelagi, et pingui conchylia succo."

N. Parthenii Giannettasi, Ecl. 1.

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I.—*The Actiniarian Family Aliciidæ*. By J. E. DUERDEN,
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of Jamaica.

[Plate I.]

IN a paper "On the Genus *Alicia*," published in this Journal (1895, xv. pp. 213–218), it was shown that an anatomical study of that genus and of the genus *Cystiactis* demanded their separation from the family Bunodidæ, where they had usually been placed, and the erection of a new family—Aliciidæ—for their reception.

The primary investigations were carried out upon *Alicia costæ*, Panc. (*A. mirabilis*, J. Y. Johnson, being the type of the genus), and upon *Cystiactis tuberculosa*, Quoy & Gaim. It was further suggested that the family might possibly include other genera, such as *Bunodeopsis*, of which but only a single species *B. strumosa*, Andr., was then known.

I have since been fortunate in obtaining, through the courtesy of Mr. J. Y. Johnson, of Madeira, an authentic specimen of his *A. mirabilis*, while removal to another hemisphere has brought me into contact with a second species of the genus *Bunodeopsis*; further, through the help of the Naples Biolo-

gical Station I have been enabled to compare the Jamaican species with the type, *B. strumosa*. Histological examination shows the first to agree very closely with the previously investigated *A. costæ*, and the two latter species confirm the original suggestion that the genus should be placed under the family Aliciidae. A description of the three species studied is given below.

With a few unimportant alterations the family was defined as follows in the paper referred to:—

Family Aliciidae.

Hexactiniæ with a large, flat, contractile base. Tentacles simple, subulate, and entacmæous. Column with simple or compound hollow outgrowths or vesicles over more or less of its surface, arranged mostly in vertical rows. No cinclides. Sphincter muscle endodermal and diffuse, variable in amount of development. Perfect mesenteries few or numerous. No acontia.

Besides the genera *Alicia* and *Cystiactis*, originally constituting the family, it is shown in a recently published paper by Prof. A. C. Haddon and myself (1896) that the genus *Thaumactis*, erected by Dr. G. H. Fowler (1889), is certainly a member of the family Aliciidae, and now the previously doubtful genus *Bunodeopsis* is definitely included. The family thus consists of the genera *Alicia*, *Cystiactis*, *Bunodeopsis*, and *Thaumactis*.

Genus ALICIA, J. Y. Johnson.

Actinia (pars), Dana, 1846.

Alicia, J. Y. Johnson, 1861.

Cladactis, Panceri, 1868.

Cladactis, Verrill, 1869.

Cladactis, Andres, 1883.

Alicia, Haddon and Shackleton, 1893.

Alicia, Duerden, 1895.

Alicia, Haddon and Duerden, 1896.

Tissues very delicate. Tentacles elongate, more or less retractile. Column long, beset nearly throughout with pedunculated or sessile, compound or simple vesicles; sphincter muscle feebly developed. Six pairs of perfect mesenteries, two pairs of which are directives.

The definition has been slightly modified, for purposes of comparison with the genus *Bunodeopsis*, from that given in 1895.

Alicia mirabilis, J. Y. Johnson.*Alicia mirabilis*, Johnson, 1861, p. 303; 1862, p. 182.*Cladactis mirabilis*, Andres, 1883, p. 443.

Form *.—Base very broad and usually adherent, capable of changing its position and of becoming free and floating upwardly at the surface of the water, may undergo great dilatation, undulate, much larger in diameter than the column, thin-walled and transparent, mesenterial lines form ridges and furrows, margin deeply crenate.

Column erect, somewhat cylindrical, enlarging above and below; beset, except towards the apex, with simple or branched pedunculated vesicular outgrowths of the coelenteron, which, in contraction, entirely hide the column-wall, but in extension allow it to be seen; column-wall thin, pellucid, marked with slight longitudinal furrows corresponding with those on the base. Vesicles small proximally, nearly sessile, bear at their summit a single thickening or wart of hemispherical outline; become larger above, may have stalks half an inch high and three-tenths of an inch in diameter, which divide and redivide very closely into as many as sixty parts, each crowned with a wart; the appearance of the vesicles when half contracted bears some resemblance to a head of cauliflower or to a strawberry; capable of considerable contraction and inflation, but non-adherent.

Tentacles simple, entacmæous, numerous, subulate, elongate, rather slender, thin-walled, transparent, filamentous at apex, often coiled and overhanging, completely but not readily retractile, arranged in three (or four) rows near the margin of the disk, beset with minute urticating areas.

Disk slightly depressed or may be inflated, not larger than the diameter of the column, pellucid; twelve radiating furrows correspond with the six pairs of perfect mesenteries.

Mouth large; lips usually distended and divided by deep furrows into six longitudinal ribs on each side; no gonidial grooves distinguishable.

Colour.—Base uniformly pale brown or impure white; column very pale brown; peduncle of the vesicles mostly opaque white, but may be orange or a pale chestnut; warts on small appendages a dull purple or grey surrounded by a ring of white; apex sometimes divided by a white line into two grey areas or by cross-lines into four areas; disk pale

* The description of the external characters is founded upon those originally published by Mr. Johnson and upon notes accompanying his later specimen.

brown; œsophagus brown; tentacles brown, paler distally, minutely spotted with darker brown.

Dimensions.—Diameter of base 12 centim.; height and diameter of column when fully expanded 6·3 centim.; length of peduncle of largest vesicles 1·25 centim., diameter 0·8 centim.; mouth 1·25 centim. across.

The individual dissected was much contracted and flattened. Its length was 2·5 centim., the longer diameter of the base 1·5 centim., and the shorter 0·7 centim.

Locality.—Three specimens only have been obtained at Madeira by Mr. J. Y. Johnson. The first and finest was the one from which his original description was taken, and was said to have been obtained at a depth of a few fathoms from a fish-basket sunk in the Bay of Funchal. It was destroyed in an attempt to take it to England. A second was sent in spirit to the British Museum, and the third was very generously placed at my disposal by Mr. Johnson.

The specimen was much contracted and flattened, and the tentacles not infolded*. The vesicles were pressed against the column-wall. It was roughly triangular in outline, the lower part being much wider than the upper. The base was radiately and concentrically folded to a small degree, the margin being crenate. Although not in a good state of preservation for histological purposes, sufficient could be distinguished to allow of a determination of the most distinctive characters.

Activities.—The polyps frequently change their position in confinement and may even float base upwards. The upper part is generally in slow constant motion. The tentacles, usually more or less displayed, may be completely retracted. The urticating powers of the tentacles and vesicles are considerable. Specimens bear confinement well.

Column-wall.—The ectoderm is well developed in the caputular region and richly supplied with nematocysts; these are, however, of a different character from those in the

* The tentacles are evidently not readily infolded in most members of the genus. Verrill (1869, p. 472) likewise mentions that most of his specimens of *C. grandis* preserved in alcohol have the tentacles more or less extended and the disk exposed.

In a later paragraph of the same paper (p. 473) Verrill states that the *Anthopleura granulifera* of Duchassaing and Michelotti (*Actinia granulifera*, Les.) appears to belong to the genus *Cladactis* (*Alicia*), since it is said to be imperforate and tuberculated. I have lately obtained the species in abundance from Jamaican waters, and it may be here mentioned that an anatomical investigation shows it is an undoubted *Bunodes*, possessing a well-developed, circumscribed, endodermal muscle.

vesicles, being smaller and showing a long spiral thread coiled up inside. They are mostly limited to the upper naked part of the column. The mesogloea is thrown into deep plaitings to support a strong endodermal muscle.

The vesicles have a broad ectoderm, which, in limited places, evidently corresponding with the thickenings at the tips, is crowded with enormous nematocysts rounded at each end. These are clear or contain granular matter, and have only a very short spiral thread; nearer the origin of the vesicles—that is, on the peduncle—they are smaller and have a long spiral thread as in the column-wall. Numerous strongly staining elongated bodies occur in the deeper part of the ectoderm, evidently developing nematocysts*. The mesogloea is thin, and the endoderm, now decomposed, contains much granular pigment matter.

Sphincter muscle.—The sphincter muscle is of the same character as that found in *Alicia costæ*, i. e. endodermal, diffuse, and elongated. The plaitings of the mesogloea are, however, better developed than in that species, becoming more dendriform and thinning out for some distance. The material does not admit of a determination of the exact limits of the muscle, but it appears to commence just below the tentacles and to extend into the region of the vesicles, being merely a concentration of the circular endodermal muscle occurring throughout the column-wall.

Tentacles.—The ectoderm of the tentacles is thick and richly supplied with nematocysts like those of the column-wall and arranged at right angles to and close to the surface. An occasional larger one, similar to the vesicular form, may be met with. The mesogloea is broad, and forms small dendriform outgrowths on its internal border for the support of the strong circular endodermal muscle.

Œsophagus.—The ectoderm of the Œsophagus is a deep layer and much folded. It contains numerous elongated stinging-cells and many large cells with pigmented granular contents, arranged in a nearly central zone.

The mesogloea is narrow and supports a weak ectodermal and endodermal musculature.

Mesenteries.—Twenty-four pairs of mesenteries are present, similar in arrangement to those of *A. costæ*, viz.: six perfect pairs, two pairs being directives; six pairs forming a second cycle, alternating with the first; and twelve pairs in a third

* In the description of *A. costæ* it is stated ('Annals,' 1895, xv. p. 216) that the vesicles are not batteries of nematocysts. A re-examination of the sections in the light of other forms shows that they must be so regarded, the so-called gland-cells being developing stinging-cells.

cycle. They further resemble those of *A. costæ* in structure, especially in the form of the mesogloæal plaitings, which are, however, a little more pronounced in the present species. Mesenterial filaments are well developed, crowding the cœlenteron; abundant granules and large stinging-cells are in connexion with them. The endoderm of the mesenteries has small nematocysts.

Gonads.—No reproductive cells could be distinguished in the single specimen examined.

Genus BUNODEOPSIS, Andres.

Bunodeopsis, Andres, 1880.

Bunodeopsis, Andres, 1883.

Bunodeopsis, Haddon and Duerden, 1896.

Tissues very delicate. Tentacles elongate, readily retractile. Column short, beset proximally with pedunculate or sessile vesicles, the vesicular area much broader than the capitulum. Sphincter muscle feebly developed. More than six pairs of perfect mesenteries.

The genus *Bunodeopsis* was established by Andres (1880) to include a form of which the distinguishing characters are that the column is short and thick, protruding here and there in hollow prominences, and with a collar developed like a capitulum. Previous to the present communication only one species—*B. strumosa*, Andr.—was known. Andres states that it closely resembles in appearance and habit the *Cystiactis Eugenia* of Duchassaing and Michelotti, found in the West Indies, differing from it only by the possession of the well-developed capitulum, and that whenever it is proved that this also possesses a similar capitulum, then the genus *Bunodeopsis* must be merged into *Cystiactis*, and its single species will become *Cystiactis strumosa*. The latter genus is thus defined by Milne-Edwards (1857, p. 276):—"Corps entièrement couvert de tubercules subtentaculiformes ou offrant l'aspect de grosses phlyctènes très-saillantes." I was in hopes of rediscovering Duchassaing and Michelotti's *C. Eugenia* around Jamaica, but so far have not been successful, unless the present undoubted *Bunodeopsis* be the same as that meant by these two authors. Considering the close similarity which has been already ascertained to exist amongst the species of Actinarians from the various West-Indian Islands, there is a little probability in this position; but when we compare the figure and description of *C. Eugenia* with that of *Bunodeopsis*, it seems far preferable to await further researches and for the present

to regard the two as distinct. It is not likely that the two distinguished zoophytologists would have neglected the elongated capitulum had it been present in their form.

Bunodeopsis antilliensis, sp. n. (Pl. I. figs. 1-4.)

Form (Pl. I. figs. 1, 2).—Base adherent, rarely free, irregular in outline, generally oval-shaped, thin-walled, and transparent, so that the mesenteries and internal organs can be seen through, margin crenate, surface thrown into ridges and grooves corresponding with the attachment of the perfect and imperfect mesenteries.

Proximal part of column covered with pedunculate irregularly arranged outgrowths or vesicles of various sizes communicating with the coelenteron; most are large, compound, and shortly clavate, having a narrow peduncle; others are spheroidal or papillate; the larger may bear digitiform outgrowths, others are merely tuberculate, and others again have only thickened ridges. These may almost disappear when the vesicles are fully inflated, the surface being then nearly smooth, the ridges and tubercles showing as slightly thickened more opaque bands. The tubercles and bands on microscopic examination are seen to be batteries of large nematocysts. Column-wall expanded and short proximally, not readily seen owing to the presence of the abundant vesicles; upper part or capitulum only visible when the animal is extended, long, cylindrical, and smooth, much less in diameter than the vesicular area, but enlarging towards the disk; walls extremely thin throughout, pellucid, the darker coloured oesophagus clearly seen through.

Tentacles completely and readily retractile, elongate, smooth, entacmæous, subulate, thin-walled, transparent, variable in number, arranged in several cycles according to the formula 6, 6, 12, 24. Examples with 12, 18, 24, 30, 36, 48, and higher numbers are met with; outer arise directly from the margin of the disk; capable of great extension; overhang the column-wall; covered with minute urticating spots. In full extension they are very delicate structures, readily detaching when handled. Disk larger in diameter than the capitulum, very thin-walled, the attachment of the mesenteries showing through; peristome generally elevated into a cone with the oral aperture at the apex; mouth oval-shaped, six well-marked ridges and grooves on each side; no gonidial groove. The disk, tentacles, and naked portion of the column-wall are usually completely infolded, so that no external indication of them is left.

Colour.—The colour of the polyps when retracted is determined by that of the vesicles, and may be light blue or light brown; the vesicles, when not fully extended, are generally pale blue in colour, the thickened bands and papillæ a dull white, when inflated to their utmost are a pale brown. In extension the capitulum, tentacles, and disk are nearly colourless, but a slight brown tint can be distinguished; the column-wall in the vesicular region, as well as the pedal disk, is brown; the lips white.

Dimensions.—The dimensions are very variable, according to the state of retraction or extension. The diameter of the base may be as much as 3·5 centim.; an average diameter of specimens retracted in formalin is 1·8 centim.; height of retracted specimens about 0·5 centim.; length of extended inner tentacles 3·5 centim.; vesicles when inflated may be 0·7 centim. in diameter and 1 centim. in length.

Locality.—The species is met with sparingly throughout Kingston Harbour, Jamaica, attached to weeds in shallow water. Around the shores of the canal behind Port Royal, and at certain other places in the harbour, it occurs in abundance.

Activities.—The usual condition presented by the animal is that of a flattened extended group of bluish-white or pale brown vesicles towards the free end of elongated marine plants, such as *Thalassia*, to which the colours offer a marked contrast. The polyps are elongated along the length of the weed, or partially folded round it, and generally exhibit no appearance of disk, tentacles, or column-wall. They well bear out Andres's statement of resemblance to Nudibranchs. They occur near the surface in shallow water around the shores, and occasionally detach themselves and move to new positions, or, more rarely, may float on the surface of the water with the base upwards. Less commonly they are fully extended, the elongated tentacles in constant motion or gracefully overhanging. The vesicles are very changeable in size and appearance according to the amount of inflation; in the same polyp some may be inflated and others not at the same time; often they and the tentacles are quite limp. The urticating powers are considerable, being sufficient to pierce the skin of the hand. It is a very delicate and sensitive species, not bearing confinement well. An asexual method of reproduction is effected by the detachment of fragments of the body-wall from around the margin of the base and column.

Base (Pl. I. fig. 3).—The three layers of the base are clearly distinguishable. The nuclei of the ectoderm are arranged mostly in a narrow zone a little below the surface, the tissue nearer the mesogloea not staining so deeply. The

latter layer is very thin. The endoderm is narrow and contains zooxanthellæ.

In several specimens sectionized the endoderm is divisible into two portions—a proximal, which is largely reticular in character, and a more internal part crowded with nuclei and zooxanthellæ (figs. 3, 4). The separation of this reticular layer, sometimes on the endodermal side and sometimes on the ectodermal side of the mesogloea, is a well-marked feature of some examples and is found practically throughout the whole polyp. The reticulum appears to be formed of the nervous and perhaps muscular and mesogloal elements, probably separated more distinctly by the unequal contraction of the mesogloea and the two other layers, but is not a constant feature of the species, being evidently partly dependent upon the method of preservation. In vertical sections of the base the mesogloea borders directly on the ectoderm, and the reticulum is on the endodermal side, whereas in the tentacles it is on the ectodermal side.

Column-wall.—The column-wall is very delicate and much broken up below by the outgrowths forming the vesicles. The nuclei in the ectoderm are uniformly distributed; nematocysts apparently do not occur, except a few, similar to those of the tentacles, in the capitulum. An ectodermal muscle on small mesogloal plaitings can be distinguished. The mesogloea is thicker than at the base and contains a few isolated cells. The endoderm has abundant nuclei and zooxanthellæ. The vesicles are hollow outgrowths of the body-wall, but their structure differs somewhat. The thickenings and tubercles seen externally are shown in sections to be batteries of nematocysts. The stinging-cells are very long, extending across the ectoderm, and are limited to the enlarged areas. Many cysts present a fine internal beaded character, due to the spiral thread seen in optical section, while others, mostly in the deeper parts, show no thread and may have the contents staining deeply, being evidently only in process of development. Small oval nuclei are, more particularly in the thickened regions, arranged in a narrow belt just below the surface. The remaining area is much vacuolated in places. The ectoderm of the vesicles where devoid of nematocysts is very thin. The mesogloea is narrow. The endoderm contains zooxanthellæ, but not pigment granules such as are abundant in *A. costæ* and *A. mirabilis*. A slight endodermal muscle can be distinguished. In the difference in the characters of the nematocysts in the vesicles and those of the column-wall and tentacles *Bunodeopsis* agrees with the two species of *Alicia* examined. They are, however, larger in the latter genus.

Sphincter muscle.—The sphincter muscle is of the diffuse

endodermal type and weak. The muscle-cells line simple or slightly branched mesogloéal plaitings, which extend from a little below the base of the outermost tentacles to near the commencement of the vesicles, *i. e.* along the capitular portion of the column.

Tentacles (Pl. I. fig. 4).—The ectoderm of the tentacles is a thick layer, with numerous closely packed nematocysts, uniformly arranged in a zone at right angles to the surface. They are smaller than those in the vesicles, and all show the spiral thread distinctly. Below the nematocyst band is a zone of small nuclei. The ectodermal muscle-cells are strong and arranged on well-developed plaitings of the mesogloea. The mesogloea is thick compared with other regions. The endoderm has numerous zooxanthellæ, and an oblique muscle occurs on smaller mesogloéal plaitings. The endodermal cells vary much in length, the whole layer presenting a very irregular internal boundary. The portion figured is from one of the specimens showing an ectodermal reticular or nervous layer very distinctly.

Disk.—The disk is an extremely thin structure, showing no important characters.

Œsophagus.—The ectoderm of the Œsophagus is much folded in both longitudinal and transverse sections, but no Œsophageal groove is indicated. Abundant deeply staining nuclei are arranged a little below the surface. It is richly ciliated all round; medium-sized nematocysts crowd the layer, and pigment-granules occur in the deeper parts; a weak ectodermal muscle is present. The mesogloea and endoderm are very thin, and not folded to the same degree as is the ectoderm. The endoderm contains many zooxanthellæ. A weak endodermal muscle is met with.

Mesenteries.—The mesenteries are in numerous pairs, but, owing to the flatness of the specimens when retracted and the crowded condition of the cœlenteron, their arrangement cannot always be readily made out. They are somewhat variable in number, and in the alternation of perfect and imperfect pairs. In one specimen eight pairs of perfect mesenteries were present, of which only one pair were directives. In another example twenty pairs were counted in the Œsophageal region. The retractor muscle on the face of the mesenteries extends for some distance from the body-wall, and the mesogloea is thrown into long narrow plaits to support it. The muscle extends completely round the smaller imperfect mesenteries. The mesenteries branch much below, nearly filling the cœlenteron. Mesenterial filaments, continuous with the ectoderm of the Œsophagus and containing nematocysts,

occur at the termination of each branch; the endoderm becomes much thickened and contains granular matter.

Gonads.—In one specimen dissected developing ova were found in great numbers extending almost the whole length of the mesentery, and in places giving rise to considerable enlargements.

Bunodeopsis strumosa, Andres. (Pl. I. fig. 5.)

Bunodeopsis strumosa, Andres, 1880, p. 315.

Bunodeopsis strumosa, Andres, 1883, p. 444, pl. vi. fig. 1, pl. xiii. fig. 5.

Form *.—Base adherent, usually large and oval, but variable in size and shape. Column short, delicate, very extensible, protruding here and there in irregular outgrowths or vesicles, the latter varying in size and simple or compound, apparently sessile, and having only very slight tubercular and annular superficial thickenings; capitulum much developed, smooth, delicate, regular, cylindrical, or caliciform. Disk medium, wider than capitulum, rounded, either flat, concave, or prominent, without gonidial marks. Tentacles retractile†, not very numerous (48), tricyclic, 12 [6, 6?], 12, 24, entacmæous, large, marginal, erect or bent outwardly, subulate, very flexible, covered with urticating spots. Peristome variable, with radiating lines; mouth sometimes with reversed lips, but not a special character; gonidial grooves wanting.

Colour.—Base whitish-brownish-yellow. Column yellowish, with yellow-brownish-ochre bands. Capitulum dirty white, uniform, transparent. Tentacles transparent, whitish. Peristome whitish.

Dimensions.—Small; basal diameter 1·5 to 2 centim.; length of tentacles 2 centim.

Locality.—Habitat on the leaves of *Cymodocea æquorea* (*Phycagrostis minor*), uprooted, floating on the surface, or else on *Posidonia*, *Zostera*, &c. Also on stones and rocks.

Varieties.—(a) *badia*. As above.

(β) *cana*. Entirely white; most frequently found on the shores of Lake Fusaro, Naples; more delicate and small.

Base.—The layers of the base are well developed, being much thicker than in the vesicular portion of the column-wall. The ectoderm is covered with a layer of short closely-set cilia; elongated nuclei are arranged in a narrow peripheral

* The description of the external characters is practically a translation of that given by Andres in 'Le Attinie.'

† A curious instance of extreme retraction was met with in one specimen; the tentacles had been withdrawn into the coelenteron, and afterwards one was forced into the interior of a distended vesicle.

band, and rounded nuclei more sparingly in a broad zone below ; circular or oval-shaped vacuolar spaces are present at intervals. The mesogloea is thin. The endoderm bears zooxanthellæ and forms a weak muscle.

Column-wall.—The column-wall is extremely delicate in the region of the vesicles, but is thicker at the capitulum. The ectoderm in the latter is a regular even layer, showing elongated nuclei; the longitudinal muscle is developed on small mesogloéal foldings; nematocysts are not present, except near the vesicles. The mesogloea is narrow and slightly folded both internally and externally; it thickens distally and becomes finely plaited to support the weak ectodermal muscle. The endoderm contains zooxanthellæ; the circular muscle is extremely weak.

The vesicles are very thin-walled, except at the parts corresponding with the opaque bands seen externally. The ectoderm is here thickened and shows abundant large nematocysts narrowing at each end. The spiral thread of the stinging-cells is not obvious. They are arranged mostly at right angles to the surface, but in places are longer than the ectoderm is broad, and become obliquely arranged. Different stages in their development are seen, the earlier ones staining deeply. The nuclei in the thickened areas are mostly in a narrow peripheral zone; elsewhere the ectoderm is a very thin layer devoid of nematocysts; oval or rounded vacuolar spaces are numerous. The mesogloea is very thin. The endoderm is a narrow regular layer of cells containing abundant zooxanthellæ. A weak ectodermal and endodermal musculature is present.

Sphincter muscle (Pl. I. fig. 5).—The sphincter muscle is an extremely weak form of the diffuse endodermal type. It occurs in the capitular region as a slight concentration of the ordinary circular endodermal muscle-fibres. The mesogloea is only a little plaited.

The sphincter is scarcely more strongly developed than the endodermal muscle of the tentacles or of the peripheral portion of the disk, and, except in position, is barely distinguishable from them.

Tentacles.—The nuclei in the tentacles are small and, in sections, more restricted to the periphery, where also a zone of long narrow nematocysts showing the spiral thread occurs, and occasionally much larger examples not exhibiting any spiral thread. A broad band of the ectoderm next the mesogloea is nearly devoid of nuclei, and does not stain with carmine; a well-developed longitudinal ectodermal muscle is present. The mesogloea is somewhat thick in places, and, with

the exception of an occasional isolated cell, is homogeneous in structure. It is plaited a little on both the ectodermal and endodermal borders for the support of the musculature. The endoderm-cells are often very long in section, the layer having irregular internal boundaries. Zooxanthellæ are present.

Disk.—The ectoderm is thick and ciliated; elongated nematocysts are present; the mesoglœa and endoderm are the same as in the tentacles. An endodermal musculature is seen.

Œsophagus.—The œsophageal walls are much folded, but there is no indication of any special groove; the ectoderm and endoderm are much thicker than the mesoglœa.

The ectoderm is richly ciliated, and, in addition to the outer zone of narrow nematocysts, contains abundant irregularly distributed large stinging-cysts. The nuclei are arranged in a broad zone; a very weak ectodermal muscle is seen in transverse sections, and a similar endodermal muscle in longitudinal sections.

Mesenteries.—In the region of the œsophagus twelve pairs of perfect mesenteries, including two pairs of directives, are present, and pairs of very short imperfect mesenteries alternate. They are broad towards the column-wall, but narrow towards the œsophagus; zooxanthellæ are sparingly present in the endoderm. The longitudinal retractor muscles are well developed for some distance on one side and the mesoglœa is thrown into supporting folds. Below the œsophagus the mesenteries branch, the endoderm becoming much thickened; each division is terminated by a rounded mesenterial filament bearing abundant nematocysts, and continuous with the ectoderm of the œsophagus.

Gonads.—No reproductive cells were present in any of the examples sectionized.

The distinctions between these two species are, in several respects, those of degree rather than of kind. Practically all the characters strongly marked in the first appear to be present in the second, but developed to a less extent. The average dimensions of the Antillean representative are two or three times those of the Mediterranean specimens received. Of a score of specimens received from Naples, preserved in 4 per cent. formalin, none exceeded 0·4 centim. in diameter across the base, while an average diameter of the Jamaican forms is 1·3 centim. The colour distinctions may be of some moment. The column in Andres's species has yellowish-brown-ochre bands; these are never met with in the new

species. In this latter the vesicles, when not fully inflated, usually have a bluish tinge, not noticed in the former.

It seems likely that the specimens received by me are the var. *cana*, which is white, more delicate, and smaller than the var. *badia*.

The vesicles appear sessile in *B. strumosa*, and do not exhibit pronounced tubercles or digitiform processes. Similar microscopic elements, however, are present in both. Again, the musculature of the two is developed along the same lines; but, whereas in *strumosa* the mesoglœa is only folded or very slightly plaited for its support, in *antilliensis* the plaits are comparatively large and numerous. In minute histological details, such as the forms of the stinging-cysts and the structure of the body-wall, they resemble one another.

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EXPLANATION OF PLATE I.

Reference letters.

<i>div.</i> Partial division between the coelenteron and the tentacular cavity.	<i>nem.</i> Nematocysts.
<i>ect.</i> Ectoderm.	<i>nuc.</i> Nuclei.
<i>ect.m.</i> Ectodermal muscle.	<i>r.lay.</i> Reticular or nervous layer.
<i>end.</i> Endoderm.	<i>sph.m.</i> Sphincter muscle.
<i>mes.</i> Mesogloea.	<i>ten.</i> Tentacle.
	<i>zoor.</i> Zooxanthellæ.

Fig. 1. *Bunodeopsis antilliensis*, sp. n. Expanded polyp, nat. size. 1 *a*, 1 *b*, 1 *c*, 1 *d*. Vesicles.

Fig. 2. Ditto. Retracted polyp, nat. size.

Fig. 3. Ditto. Vertical section through a portion of the base, $\times 200$.

Fig. 4. Ditto. Transverse section through a portion of a tentacle, $\times 200$.

Fig. 5. *Bunodeopsis strumosa*, Andres. Vertical section through capitulum and a portion of one side of a tentacle, $\times 200$.

Biological Laboratory,
Museum, Institute of Jamaica,
Kingston,
March 29, 1897.

II.—On a Collection of Heterocera made in the Transvaal.

By W. L. DISTANT.

Fam. Zygænidæ.

Species obtained in the Transvaal.

Neurosymploca agria, Dist. Pretoria.

— *concinna*, Dalm. Pretoria.

Zutulba Zelleri, Wallengr. Zoutpansberg.

Crameria clæckneria, Stoll. Pretoria.

Syntomis Kuhlweinii, Lef. Zoutpansberg (*Kæssner*),

— *sirius*, sp. n. Pienaars River (*W. L. D.*), Zoutpansberg (*Kæssner*).

— *Rendalli*, sp. n. Barberton (*Dr. P. Rendall*).

Parasyntomis æthiops, sp. n. Zoutpansberg (*Kæssner*).

Thyretes caffra, Wallengr. Pretoria.

Ercssa fulvescens, Walk. Pretoria, Zoutpansberg.

Euchromia africana, Butl. Pretoria.

Species obtained in Natal.

Zutulba ampla, Walk. Durban.

Syntomis Kuhlweinii, Lef. Durban.

Euchromia africana, Butl. Durban.

— *Folletii*, Gray. Durban.

Unless otherwise specified, the captures were my own.

Syntomis sirius, sp. n.

Body, legs, and antennæ black.